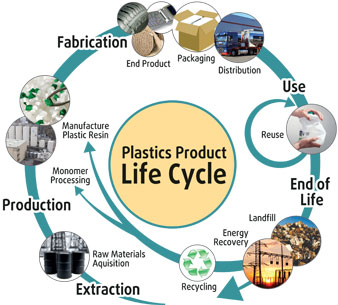
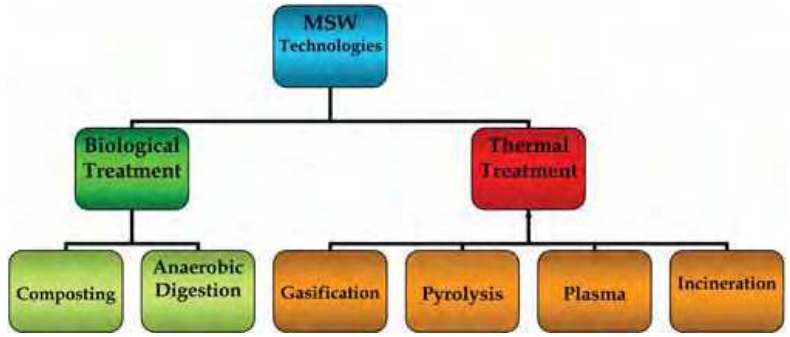
Day 48 | SVN3M Unit 3 Waste Management & Reduction Review Mr. Zuberi

1. Describe, in order, the key steps involved in the life-cycle of a product (i.e., the waste associated with all the materials and energy that go into the development and disposal of a running shoe).  
     
   
2. What are two forms of waste treatments?  
   A: Biological (natural method for organic waste) and thermal (man-made techniques to dispose waste)
3. Draw a tree diagram that explains the variety of specific biological and thermal waste treatments.  
   
4. Briefly describe the process used by each waste treatment.  
     
   a) Composting: A biological process that uses a mixture of decaying organic substances, like dead leaves or manure, for fertilizing soil. The decomposition is assisted with some initial soil, water, shredded plant matter, and aeration (by rotating the mixture). Worms and fungi further break up the material.   
     
   b) Anaerobic digestion: A series of biological processes in which microorganisms break down biodegradable material in the absence of oxygen.   
   - Bacterial hydrolysis - breaks down insoluble organic polymers (i.e,. carbohydrates) and makes them available for other bacteria.   
   - Then different forms of bacteria do the following conversions:   
   sugars and amino acids 🡪 carbon dioxide, hydrogen, ammonia, and organic acids 🡪 acetic acid (organic compound / main component of vinegar), along with additional ammonia, hydrogen, and carbon dioxide 🡪 methane and carbon dioxide (help anaerobic wastewater treatment)  
     
   c) Gasification: a thermal process that converts carbon-containing materials (i.e., coal, fossils) to carbon monoxide, hydrogen, and carbon dioxide and can produce electric power and fertilizer.   
     
   d) Pyrolysis: the thermal degradation of carbon materials through indirect external sources of heat (between ~ 450 to 750°C), in the absence or oxygen.  
     
   e) Plasma: gases and powerful electrodes create plasma (aka 4th state of matter) and is an ionized gas – free-roaming electrons carrying a current generating a magnetic field ( ~ 6000 deg. Celcius – hotter than the sun). Garbage undergoes molecular dissociation.  
     
   f) Incineration: involves combustion (rapid oxidation and heat) of organic substances contained in waste materials.
5. What are the benefits that worms provide to composts?  
   A:   
   - Free fertilizer and reduction in garbage bill as there is less garbage leaving the house (U.S.)  
   - Facilitate/speed up fertilization process   
   - Worm castings leave beneficial microbes 🡪 help plants from many types of diseases & increase biodiversity and fertility of soil  
   - Worms feed off of bacteria and fungi that breakdown the organic matter  
   - Worm castings are inoculated & have beneficial bacterium fungi that increase the biodiversity of the soil and attack or compete with bacterium fungi that can causes diseases in plants.  
   - Make fertilizer for free pretty much rather than buying it  
   - Worm castings contain mucus that prevent nutrients from washing away while watering and holds moisture better than plain soil
6. Evaluate the short- and long-term impact on the environment of three of the following types of waste:   
   - waste products from animal farming  
   - plastic shopping bags  
   - tailings from mines  
   - non-rechargeable batteries  
   - diapers  
   - dumping solid waste in lakes  
   - nuclear waste  
     
   Example:   
   Batteries contain heavy metals (such as mercury, cadmium, nickel, and lead) which can contaminate the environment when improperly disposed. If incinerated, certain toxic metals are released in the air and can concentrate the combustion ash, and might even result in an explosion. One should call local sanitation center to properly dispose of batteries.
7. Explain advanced waste management strategies such as accelerated waste aeration and bioremediation.  
     
   Aeration:   
     
   Bioremediation:
8. Why is exporting e-waste to developing countries illegal?